

PROJECT NUMBER: 1702  
PROJECT TITLE: Optical Processing and Aerosol Research  
PROJECT LEADER: K. A. Cox  
PERIOD COVERED: October, 1988

I. PACK INSPECTION (R. Maher and C. Harward)

- A. Objective: Develop and implement a method for digital pack inspection.
- B. Results: After a review of a number of digital imaging systems, the system manufactured by Androx of Canton, MA, has been selected for implementation of the digital inspection algorithm. Androx will supply a single board which, when used with the Sun 3 microcomputer, can execute the inspection algorithm at the rate of 10 per second. Furthermore, the calculations needed in the training step can be carried out on the imaging board, thereby reducing the time required for this step.
- C. Plans: Implement the inspection algorithm using the Androx imaging board. Carry out a systematic evaluation of the performance of the system using a set of both acceptable and defective Lark cigarette packs.

II. AEROSOL RESEARCH (T. Nguyen)

- A. Objective: Add the constraint of non-negativity to the algorithm for obtaining aerosol particle size distributions (PSD) from light extinction data.
- B. Results: Available algorithms for obtaining aerosol particle size distributions from light extinction data often yield unphysical results when the data contains even a small amount of error. Our method for inverting extinction data was modified to incorporate the constraint that the PSD be everywhere positive. The algorithm has been found to work very well when tested with data at a variety of error levels.
- C. Plans: Carry out a systematic evaluation of the capabilities of the algorithm.

III. INDIVIDUAL CIGARETTE INSPECTION (D. Lowitz)

- A. Objective: Develop methods for the online inspection of individual cigarettes.
- B. Results: A meeting was held with Reticon personnel to discuss the possibility of using their linear CCD array for image acquisition in the individual cigarette inspection system. The speed of the array was found to be insufficient and the lighting requirements were expected to be excessive. The acoustooptic linear scanner proposed by Brimose Corporation now appears to be our best choice,

although the applicability of a rotating polygon mirror scanning system remains under consideration.

IV. GLOBAL HOLONETICS "SMART CAMERA" (Charles Harward)

- A. Objective: Evaluate the defect detection capability of the Global Holonetics "Smart Camera" (SC).
- B. Results: The in-house evaluation of the Smart Camera is still on hold due to temperature sensitivity of the device. Global has been working to correct this problem since the middle of June. Global has worked with HNC (the neural net people) to develop an algorithm to distinguish between good and defective packs where the system was trained on only good packs. They have been successful in distinguishing good cigarette packs from cigarette packs with no closure stamps, closure stamps in the wrong place, and packs with side-to-side registration misalignment. They expect to ship us the first prototype system with the neural network option in mid-November.
- C. Plans: Evaluate the inspection system when it becomes available.